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ABSTRACT

A survey of the Fortune 500 corporations was conducted to ascertain the pervasiveness and perceived impact of five electronic communication technologies (electronic mail, videotex, interactive computers, video teleconferencing, and word processing). Ninety-four corporations responded to a 53-item questionnaire and follow-up survey. Analysis of the results indicated that word processing was the most pervasive technology used, followed, in order, by interactive computers, electronic mail, videotex, and video teleconferencing. Secretaries were the primary users of word processing, while middle managers and technical specialists were the main users of interactive computers, videotex, and electronic mail. Other findings showed that the growth in electronic communication technologies has, generally speaking, effected a slight to moderate change in employee productivity, a slight increase in employee job satisfaction, no change in employee commitment to the companies, a slight to moderate increase in corporate information dissemination capability, and a moderate increase in workload capacity of company offices. In addition, it was found that while word processing has, generally speaking, made information processing faster in offices, it has not made those offices more reliant upon written communication. Finally, the findings revealed that there is some apprehension among employees in the offices surveyed about the rapid emergence of the technologies, specifically in terms of having to learn how to use them and of coping with the changes involved. (FL)

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The Pervasiveness and Impact of Electronic Communication Technologies in Organizations: A Survey of Major American Corporations

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ABSTRACT

A survey of major American corporations was conducted to ascertain the pervasiveness and perceived impact of five electronic communication technologies (electronic mail, videotex, interactive computers, video teleconferencing, word processing). A 53-item questionnaire was mailed to the public affairs directors of the Fortune 500 corporations to secure this assessment. A total of 94 questionnaires were returned for analysis. The results of the investigation and their implications are discussed.

The Pervasiveness and Impact of Electronic Communication Technologies in Organizations: A Survey of Major American Corporations

For several years now, a wide range of communicative technological innovations have been available to organizations for operational use. These include electronic mail, videotex, interactive computers, video teleconferencing, and word processing. According to a number of scholars (Forney, 1982; Fowler and Wackerbarth, 1980; Svenning, 1983), these innovations as part of the new information technology will inevitably lead to a considerable restructuring of communication channels between people within and between organizations.

Fowler and Wackerbarth (1980) state that "Technological advances in communication make it possible to unite individuals and groups in distant locations..." (p. 236) Thus, the new communication technology has provided organizations with a tremendous potential for increasing their effectiveness (Svenning, 1983). However, as Ryan (1976) has pointed out, the success or failure of new communication technology depends upon user reactions to it. Svenning (1983) suggests that the benefits of technological innovations "...can be realized only when individual members of the organizations accept and effectively utilize the new communication and computing options adopted by organizations." (p. 1)

It is evident that the new communication technology will have a dramatic effect on the operational efficiency of many organizations. It quite possibly will alter the nature of organizational tasks and the way in which those tasks are

performed. Therefore, researchers interested in examining organizational effectiveness should, in part, investigate the nature and emerging effects of the new technological communication innovations as they increasingly become implemented within organizations.

The purpose of this study was to assess the pervasiveness of five electronic communication technologies in organizations (electronic mail, videotex, interactive computers, video teleconferencing, word processing), as well as their impact upon the individual employee and general organizational functioning. A 53-item questionnaire, designed by the investigators,[1] was mailed to the public affairs directors of the Fortune 500 corporations.[2] Some time after the initial mailing, a follow-up mailing was executed to maximize the corporate response rate. A total of 94 questionnaires were returned for analysis.[3]

Organizations Surveyed

Of the 94 corporations responding to the questionnaire, twenty-seven percent could be designated as national in scope, while seventy-three percent could be designated as international in scope. The international corporations involved were found to have branch offices on other continents as follows: (1) Europe, sixty-six percent; (2) Asia, forty-six percent; (3) South America, forty-two percent; (4) North America (aside from the United States), thirty-nine percent; (5) Australia, thirty-five percent; and (6) Africa, thirty-one percent.

Status of Corporate Electronic Communication Technology

Electronic Mail. Fifty-six percent of the responding corporations reported that they had electronic mail services available to them. Forty-two percent used electronic mail internally; forty-four percent utilized it between branch offices; and thirteen percent employed electronic mail in communicating with other companies.

Thirty-three percent of the reporting companies indicated that they used electronic mail on a regular basis, nineteen percent said they did so on a selective basis, and four percent indicated that they used it only rarely. In terms of the types of employees who utilized the services, the companies reported that in twenty-nine percent of the cases executives were involved, in forty-four percent of them middle managers were electronic mail users, in thirty-seven percent of them technical specialists could be identified as users, and in thirty-two percent of the cases clerical personnel were involved. The following percentages were reported by the companies in terms of the ratio of employees tied into the electronic mail system: (a) ten percent of the employees, thirty percent of the companies; (b) eleven to twenty percent of the employees, thirteen percent of the companies; (c) twenty-one to thirty percent of the employees, six percent of the companies; (d) thirty-one to forty percent of the employees, three percent of the companies; (e) forty-one to fifty percent of the employees, one percent of the companies; and (f) over fifty percent of the employees, none of the companies.

When asked with whom electronic mail communication took place in their corporations, respondents indicated that: (a) for thirty-eight percent of them, this involved interaction with supervisors; (b) for thirty-six percent of them, this amounted to interaction with subordinates; and (c) for forty-eight percent of them, this involved interaction with peers.

When asked about the content of the electronic mail communication in their corporations, respondents indicated that such interaction pertained to: (a) task coordination for twenty-eight percent of them; (b) information dissemination for fifty percent of them; (c) decision making for twenty percent of them; and (d) information gathering for thirty-four percent of them.

In terms of the corporate offices involved in electronic mail exchanges, the responding organizations reported the participation of the following: (a) the personnel department for twenty-six percent of them; (b) the public affairs department for twenty-six percent of them; (c) the sales department for thirty-one percent of them; (d) the marketing department for twenty-eight percent of them; (e) the research and development department for twenty-nine percent of them; and (f) the accounting department for thirty-seven percent of them.

Videotex. Twenty-six percent of the responding firms indicated that they utilized a videotex system (on-line data base) in their organizations. Twenty-one percent used videotex internally; seventeen percent employed videotex between branch

offices; and six percent utilized videotex in communicating with other companies.

Seventeen percent of the organizations reported using videotex on a regular basis, nine percent on a selective basis. In terms of the types of employees involved in the utilization of the technology, the companies indicated that in seven percent of the cases executives were involved, in nineteen percent of the cases middle managers were users, in twenty-one percent of the cases technical specialists were participants, and in fourteen percent of the cases clerical personnel were users.

Interactive Computers. Ninety-four percent of the responding corporations indicated that they utilized interactive computers, seventy-five percent for use internally, sixty-one percent for use in communication with branch offices, and twenty-one percent for use in communication with other companies. Seventy percent of the firms reported that they used the technology on a regular basis, while another thirteen percent did so on a selective basis.

In terms of the types of employees involved in the utilization of the technology, the companies indicated that in seventeen percent of the cases executives were involved, in fifty-eight percent of the cases middle managers were users, and in seventy-nine percent of the cases technical specialists were involved.

When asked what percentage of employees utilized the technology, the corporate representatives responded as follows: (a) under ten percent of the employees, thirty percent of the

companies; (b) eleven to twenty percent of the employees, twenty-three percent of the companies; (c) twenty-one to thirty percent of the employees, sixteen percent of the companies; (d) thirty-one to forty percent of the employees, eight percent of the companies; and (e) over fifty percent of the employees, six percent of the companies.

When asked for what purpose interactive computer activity took place in their corporations, respondents indicated that: (a) for ten percent of them, this involved employee instruction; (b) for eighteen percent of them, this involved problem solving; (c) for twenty-seven percent of them, this involved information storage; and (d) for thirty-one percent of them, this involved information retrieval.

In terms of the corporate offices involved in interactive computer activity, the responding organizations reported the participation of the following: (a) the personnel department for thirteen percent of them; (b) the public affairs department for ten percent of them; (c) the sales department for nineteen percent of them; (d) the marketing department for nineteen percent of them; (e) the research and development department for twenty-two percent of them; and (f) the accounting department for twenty-nine percent of them.

Video Teleconferencing. Only sixteen percent of the responding organizations indicated that they utilized video teleconferencing. Of those firms employing the technology, the majority used it within the firm on a selective basis (ten

percent of all the companies surveyed), or between branch offices on a selective basis (eight percent of all the companies surveyed), but only rarely with other companies.

In terms of the types of employees who employed the technology, the companies reported that in twelve percent of the cases executives were the users, in fourteen percent of the cases middle managers were involved, and in ten percent of the cases technical specialists were the users. The following percentages were provided by the companies as to the ratio of employee participants in the firms. (a) under five percent of the employees, twelve percent of the companies; (b) six to ten percent of the employees, one percent of the companies; (c) eleven to fifteen percent of the employees, two percent of the companies; (d) sixteen to twenty percent of the employees, none of the companies; and (e) over twenty percent of the employees, one percent of the companies.

A number of questions were asked of the corporate representatives in regard to the facility requirements associated with their use of video teleconferencing. Fourteen percent of the respondents indicated that they employed one viewing screen at each site. Nine percent of the corporate representatives indicated that they had transmission and receiving sites on the corporate grounds for operating their video teleconferencing equipment, eight percent indicated that they did not. Eleven percent of the respondents reported that their organizations utilized a conference room for video teleconferencing purposes.

Two percent of the companies indicated that they utilized a single camera at each site; ten percent said they employed multiple cameras at each site. Fifteen percent of the firms reported using visual aids to augment their video teleconferencing presentations.

When asked for what purpose video teleconferencing was employed in their organizations, respondents indicated that: (a) for fourteen percent of them, this involved information sharing; (b) for five percent of them, this involved decision-making activity; (c) for five percent of them, this involved brainstorming activity; and (d) for eight percent this involved task coordination.

In terms of the corporate offices involved in the video teleconferencing activity, the responding organizations reported the participation of the following: (a) executive management for nine percent of them; (b) the sales force for eight percent of them; (c) the marketing team for ten percent of them; and (d) research and development for eleven percent of them.

Word Processing. Ninety-seven percent of the corporation representatives surveyed reported the availability of word processing technology in their firms. When asked what percentage of employees utilized the technology, the corporate representatives responded as follows: (a) under twenty percent of the employees, sixty-four percent of the companies; (b) twenty-one to forty percent of the employees, twenty percent of the companies; (c) forty-one to sixty percent of the employees, three percent of

the companies; and (e) eighty-one to one hundred percent of the employees, none of the companies.

In terms of the type of employees involved in the utilization of the technology, the company representatives indicated the following levels of participation: (a) executives for nineteen percent of the firms; (b) middle managers for forty-three of the firms; (c) technical specialists for fifty-three percent of the firms; and (d) secretaries for eighty-two percent of the firms.

In terms of the corporate offices utilizing word processing technology, the responding organizations reported the participation of the following: (a) research and development for forty-eight percent of them; (b) public affairs for fifty-six percent of them; (c) marketing for fifty-four percent of them; and (d) personnel for sixty-seven percent of them.

Perceived Impact of Electronic Communication Technology

When asked if the adoption of any or all of the electronic communication technologies described in this analysis had affected their company's reliance on face-to-face meetings, the majority of the public affairs directors (sixty-three percent) responded negatively.

The corporate representatives were asked to respond to the possible effects of the emergence and growth of electronic communication technologies in their firms in terms of eight factors associated with their overall functioning. Table 1 in the appendix of this paper reflects the responses to these items. In terms of employee productivity sixteen percent reported a

strong increase, thirty-six percent reported a moderate increase, thirty-nine percent reported a slight increase, while nine percent reported no change.

The majority of respondents perceived a slight increase in employee job satisfaction as a result of the emergence and growth of the technologies. Seven percent reported a strong increase, as much as twenty-eight percent indicated a moderate increase, while twenty-three percent perceived no change.

In terms of employee commitment to the company, the clear majority of respondents perceived no change. Four percent reported a strong increase, fifteen percent perceived a moderate increase, and sixteen percent reported a slight increase. Interestly, one percent of the representatives perceived a moderate decrease.

Corporate information dissemination capability was perceived by the respondents as follows as a result of the emergence and growth of the technologies: (a) strong increase for twenty-four percent of the firms; (b) moderate increase for thirty-five percent of the firms; (c) slight increase for twenty-one percent of the firms; (d) no change for sixteen percent of the firms. Interestly, two percent of the responding organizations reported a slight decrease.

By a rather substantial margin, the majority of company representatives (forty-eight percent) perceived a moderate increase in corporate information retrieval capability as an outcome of the technologies. In addition, nineteen percent

reported a strong increase, twenty-two percent reported a slight increase, and eleven percent reported no change.

In terms of employee time management capability, the following perceptions were reported: (a) strong increase, four percent of the firms; (b) moderate increase, thirty-five percent of the firms; (c) slight increase, thirty-nine percent of the firms; and (d) no change for twenty-two percent of the firms.

Finally, the majority of respondents (forty-six percent) reported a moderate increase in the workload capacity of company offices as a by-product of the emergence and growth of these technologies. In addition, five percent reported a strong increase, twenty-five percent reported a slight increase, and twenty-three percent reported no change. Interestly, one percent of the respondents reported a slight decrease.

Respondents were asked several questions about the possible impact of video teleconferencing in particular in their organizations. Twelve percent of the respondents indicated that wider personnel resources were employed in decision-making processes due to this technology, whereas nine percent reported no such effect. Eleven percent of the respondents indicated that the quality of decision making changed as a result of the technology, while ten percent reported no such effect. Twenty-one percent of the respondents indicated that organizational representatives were traveling less as a result of the technology; thirty-two percent indicated that this was not the case.

Respondents were asked two questions in regard to the possible effects of word processing upon corporate functioning. A clear majority of respondents (sixty-five percent) believed that word processing had made corporate information processing noticeably faster. Seventy-two percent of the respondents did not believe that word processing had made their organizations more reliant upon written communication.

Finally, respondents were asked about the apprehensiveness of employees in their organizations toward the rapid emergence of the new communication technologies. In terms of learning the new technologies, the following indications were given: (a) not at all, twenty-six percent of the firms; (b) slightly, forty-five percent of the firms; (c) moderately, nineteen percent of the firms; and (d) extremely, five percent of the firms.

In terms of coping with the change involved, the following indications were given: (a) not at all, twenty-one percent of the firms; (b) slightly, forty-five percent of the firms; (c) moderately, twenty-three percent of the firms; and (d) extremely, six percent of the firms.

In terms of any perception of threat of job security, the following indications were given: (a) not at all, thirty-six percent of the firms; (b) slightly, forty-two percent of the firms; (c) moderately, fifteen percent of the firms; and (d) extremely, three percent of the firms.

In terms of any potential reduction of face-to-face interpersonal contact with others, the following indications were

given: (a) not at all, fifty percent of the firms; (b) slightly, thirty-two percent of the firms; (c) moderately, eleven percent of the firms; and (d) extremely, one percent of the firms.

Conclusions

On the basis of the foregoing analysis, a number of conclusions can be reached in regard to the status and perceived impact of the five electronic communication technologies focused upon in this study (electronic mail, videotex, interactive computers, video teleconferencing, word processing).

1. Electronic mail, the third most pervasive system analyzed here, is in use in about one-half of the major corporations. It is used generally speaking internally and between branch offices on a regular basis. Middle managers and technical specialists are the primary users of the technology, with clerical personnel and executives running close behind. A small percentage (under ten percent) of the corporate workforce is using the technology. Electronic mail is used in these organizations for interactions with supervisors, subordinates, and peers, its communication functions being primarily information dissemination, but also information gathering, task coordination, and decision making. This technology is employed in about a third of the companies in any or a combination of the following departments: personnel, public affairs, sales, marketing, research and development, and accounting.

2. Videotex, the fourth most pervasive system analyzed here, is found in only one quarter of major American corporations. It is used internally and between branch offices on a regular or selective basis. Middle managers, technical specialists, and more rarely clerical personnel are its primary users.

3. Interactive computers, the second most pervasive system analyzed here, are found in nearly every major American corporation. While they are used primarily internally and between branch offices, they are used to some degree for communicating with other companies. This technology is employed by the corporations on a regular basis. Technical specialists and middle managers are the primary users of this technology. Generally speaking, the technology is no more widespread in the organizations than among twenty percent of the employees. The technology is used by the major corporations primarily for information retrieval and storage, but also for problem-solving activities and to a lesser degree for employee instruction. Corporate accounting, research and development, marketing, and sales offices appear to be the primary users of the technology, with personnel and public affairs offices using it to a much lesser degree.

4. Video teleconferencing is the rarest commodity of the electronic technologies examined. It is used internally and between branch offices on a selective basis by executives,

middle managers, and technical specialists, primarily for information-sharing purposes. Users include corporate executives, marketing and sales team members, and research and development personnel. Under five percent of the employees are involved in the use of the technology. Generally speaking, corporations having the technology utilize one viewing screen at each site, a conference room, multiple cameras at each site, and visual aids to augment their presentations.

5. Word processing, the most pervasive electronic communication technology analyzed here, is found in nearly every major corporation. Generally speaking, no more than twenty percent of corporate employees are involved in the technology, with secretaries the primary users and middle managers and technical specialists rather substantial secondary users. Corporate offices utilizing the technology include personnel, public affairs, marketing, and research and development.

6. The emergence and growth in electronic communication technologies has, generally speaking, affected in major American corporations a slight to moderate increase in employee productivity; a slight increase in employee job satisfaction; no change in employee commitment to the companies; a slight to moderate increase in corporate information dissemination capability; a moderate increase in corporate information storage capacity and information

retrieval capability; a slight to moderate increase in employee time management capability; and a moderate increase in workload capacity of company offices.

7. Word processing has, generally speaking, made information processing faster in the major American corporations, though it has not made these organizations more reliant upon written communication.

8. Finally, there appears to be come slight apprehension among employees in the major American corporations about the rapid emergence of these electronic technologies, specifically in terms of learning the new technologies and coping with the changes involved. Employees appear to be divided between being slightly apprehensive and not at all apprehensive in terms of job security threats as a result of technology adoption. While a substantial number of employees are slightly apprehensive about the technologies as they might reduce interpersonal contact with others, the majority are not at all concerned about this.

This investigation suggests that at least word processing and interactive computers are wide spread electronic communication technologies in organizations, with electronic mail systems present in about one-half of such companies. While these technologies may be making companies process information more quickly, the impact upon employees in terms of possible reduced face-to-face contact, with greater reliance upon mechanical forms of communication, needs to be fully assessed. Organizations,

while experiencing increases in employee productivity and satisfaction, need to be highly sensitive to the apprehensions employees may have as part of the adoption and implementation of these technologies. As such technological advances become more pervasive the dynamics of human interaction need to be monitored so that organizational life does not simply be reduced to two-dimensional form devoid of the benefits of more personalized interaction.

Footnotes

[1]A copy of the instrument may be obtained upon request from the authors.

[2]Fortune, May 3, 1982, pages 260-278.

[3]The 94 questionnaires represent a nineteen percent return rate. It is likely that those corporations responding to the survey are to a greater degree adopters of these technological systems. Therefore, the results described herein probably represent an extreme to which other sizeable corporations are moving. The results reported should be viewed within this framework.

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TABLE 1

PERCEIVED EFFECT OF ELECTRONIC COMMUNICATION TECHNOLOGIES

	Strong Increase	Moderate Increase	Slight Increase	No Change	Slight Decrease	Moderate Decrease	Strong Decrease
Employee productivity (n = 82)	13 (16%)	30 (36%)	32 (39%)	7 (9%)	—	—	—
Employee job satisfaction (n = 79)	6 (7%)	22 (28%)	33 (42%)	18 (23%)	—	—	—
Employee commitment to company (n = 80)	3 (4%)	12 (15%)	13 (16%)	51 (64%)	—	1 (1%)	—
Corporate information dissemination capability (n = 82)	20 (24%)	29 (35%)	25 (31%)	8 (10%)	—	—	—
Corporate information storage capacity (n = 81)	20 (25%)	29 (36%)	17 (21%)	13 (16%)	2 (2%)	—	—
Corporate information retrieval capability (n = 82)	16 (19%)	39 (48%)	18 (22%)	9 (11%)	—	—	—
Employee time management capability (n = 79)	3 (4%)	28 (35%)	31 (39%)	17 (22%)	—	—	—
Workload capacity of company offices (n = 78)	4 (5%)	36 (46%)	19 (25%)	18 (23%)	1 (1%)	—	—